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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
RANGE RESEARCH

November, 1927.

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BRANCH OF RESEARCH

November, 1927

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FOREWORD

The science of forestry must serve practical forestry. It must be capable of providing practical forestry with the most practical weapons in an easily utilized form. Yet this does not imply that the methods of research should also be simple and easy to apply. From the history of silviculture one could quote exceedingly illuminating examples of the application of practical methods to research work, or in other words, of attempts that have been made to investigate complicated matters with inadequate preparation and insufficiently exact and reliable means of investigation, with the result that the outcome of such research was of as little practical use as it had scientific value. For a person using a telephone it is altogether immaterial to know how complicated were the processes that went to the invention of the telephone; for him the main thing is that the telephone he may chance to use or own works properly and that it is easy to look after and to use. Similarly, it is nothing to the forester engaged in practical work, how laboriously any of the results of the science of forestry have been attained; the chief thing for him is that the result is reliable and that it can be applied without difficulty to practice. In spite of the fact that forestry is an eminently practical field, the worker in the science of forestry may not be deterred even by the most difficult and complicated methods of research, if reliable and practical results are not to be achieved in any other way. The guiding principle of scientific forest research might be formulated thus: scientifically valid methods of research, but purely practical aims.

From "The Scientific Foundation of Forestry, as Exemplified Chiefly by Forest Research work in Suomi." By A. K. Cajander, Director General of the Board of Forestry in Suomi.

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(Over)

EUROPEAN NOTES

By A. F. Hough,
Allegheny Station.

One of the most significant and perhaps not always appreciated trends of forest management in Central Europe may be summed up as follows: There is a greater tendency toward more elasticity in forest management plans since it has been found that over long periods of time it is impossible to exactly follow cut and dried formulas for the determination of cut or yield.

In the European forests there have been departures from the original working plans in a number of cases and the tendency at present is toward placing more and more responsibility on the forest officer in charge of a given area and depending on his experience and judgment to secure the best results.

Such a scheme would be of doubtful efficacy in this country due chiefly to the lack of foresters having sufficiently long experience in producing forest crops on any given area. It has been successful in the state forests of Germany and France, however. Stock is taken of the forest capital at intervals of ten years and the cutting budget determined for the next period. The condition of the forest with respect to normal distribution of age classes, etc., is ascertained and the actual cut is a compromise between the amount which may be cut on a sustained yield to supply the economic demand for wood products, and the volume necessary to remove in order to approach or maintain this condition of normality.

Where the forester has sufficient experience and has demonstrated the soundness of his silvicultural practice he is permitted to decide upon his own initiative both the volume or amount of timber to be removed in any given year within his 10-year cutting budget, and the places from which it shall be cut. An example of this was seen on the Schifferschafts Forest in Baden, Black Forest, last summer. Oberforstrat Stephani has developed an uneven-aged forest of silver fir and spruce, with a mixture of beech, for silvicultural reasons. His idea is to aid the larger best-formed, vigorous trees to become wind-firm and produce high increment by favoring them in his thinnings under a selection system. At present there is a preponderance of the older age classes (69%) owing to former exploitation over large areas in the 18th century, fol-

lowed by artificial reforestation which began early in the 19th century. Regeneration comes in naturally and is obtained by different systems, e.g., the group system, strip system, and the shelterwood compartment system. As mentioned, the forester has entire responsibility for the allocation of the area from which the volume of timber to be removed annually shall be taken, and its amount.

On the whole, all the foresters with whom contacts were made were agreed as to the advisability of producing mixed rather than pure coniferous forests for reasons of silviculture and soil betterment. Examples of the introduction of an understory of beech (Fagus sylvatica) into forests of Scotch pine were seen in France and in the Rhine Valley forests near Darmstadt and Mannheim, as well as in Bavaria. Of course the forests of Pinus maritima along the French coast are purely pine.

Natural reproduction is being used largely in the oak-beech forests of central France and in the maratime pine region. Planting or sowing is only resorted to in the event of a failure or for the introduction of conifers on certain poorer sites in the French oak-beech forests. In this connection it may be of interest to state that the growth of silver fir (Abies pectinata) on sites too poor for oak is very good and much more rapid than the oak and beech. There are, however, certain exceptions to the rule that natural reproduction is being relied on to a greater extent than previously. In the case of the Scotch pine forests of the Rhine Valley, created artificially on shifting sand and heath lands, a problem has arisen in connection with the use of natural regeneration. This is known as the "race" problem and is the result of the formerly little understood fact that there is such a thing as heredity in trees. Seed from the twisted, wind-blown coast trees of Denmark and other places along the Baltic was obtained owing to its cheapness. The progeny of these trees has exhibited unto the third generation the characteristic twisted form of the parent trees. This has made the use of planting necessary in order to improve the present stands. Artificial regeneration by use of "tungya" methods has also been fostered by the intensive use of land necessary to support the dense population of this section, potatoes being the crop raised between the rows of pine seedlings for the first two years after cutting the forest.

In the case of the Spessart oak forest natural reproduction is not relied on to produce the dense stand desired during the juvenile stages in the production of veneer oak logs, (i.e., the first 50 or 60 years). It is desired to produce a dense and fairly even-

aged stand so that the trees may grow tall and straight and form narrow growth rings suitable for high-class veneer stock. Here a "ladder type" of sowing is used, seed spots being laid out in the form of parallel strips with the cross bars as of a ladder. Older beech trees are left on the area as a protection to the young seedlings from frost, and that throughout the 300-year rotation beech is kept on the stand as a trainer to cause the oak to develop tall, straight, symmetrical boles, though several rotations of the shorter-lived beech may be required for this purpose.

One other exception to the use of natural reproduction is seen in the spruce forests of Bavaria, into which beech must be introduced artificially, and where fencing against the deer damage to young beech, silver fir, and spruce is often necessary.

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FOREST EXPERIMENT STATIONS

Washington

After having visited the Southern and Appalachian Stations, Munns again returned to Washington about the middle of the month to take up in earnest the fall and winter work. A considerable number of manuscripts had accumulated during the summer, and these, together with many other matters upon which action had been delayed, are awaiting attention. A considerable number of manuscripts are lined up for publication and several should be submitted to the Printing Office during the winter. The first of the annual investigative programs for the year, that of the Southern Station, was received.

In working out plans for the winter season, it has been decided to have a number of men in Washington on detail. Three men, one each from the Allegheny, Appalachian and Central States, are to work with the Section of Forest Measurements on the oak volume and yield study, a project of the Central States Station in which the other units are cooperating. These men will be in Washington shortly after the first of the year for a period of from six weeks to two months. Kotok will come to Washington sometime in January for perhaps as much as three weeks to put the California fire study through the tabulating machine. Incidentally he will bring other things with him. Pearson, from the Southwestern Station, will be in Washington for a six weeks or two months' period, commencing about the first of February, to assist in the general handling of the office work and to work on his Forest Types manuscript.

Forest Measurements

Reineke left for the Appalachian Station the latter part of November to be gone until the first of the year. Bruce is expected back again in Washington the middle of December to take up his work with the Service.

Following Miss Stabler's retirement from the Forest Service, a new departure is to be followed. Heretofore it has been the policy to use the Section of Measurements largely to carry on work of a general computing and statistical nature. In the present instance, the place thus made vacant by Miss Stabler's retirement is to be filled by a Junior Forester, the position thus created to become a training one for men who later may be transferred to the stations. This will enable us to give younger men a chance to acquire mensurational technique, and to get a better knowledge

of statistical principles as applied to silviculture. The first man to fill the place is E. R. Martell, who is being transferred temporarily from the Alabama Forest. It is planned that Martell will fill the vacancy only until sometime in the late spring.

Bibliography

Many of the Stations are interested in the development of a card index and desire to get the library of Congress cards. It has been possible this past month to ascertain the cost of all the Library of Congress forestry index cards from 1900 to date, as $250. This includes the so-called "dictionary set" embracing some 3 or 4 cards for each title. This set hardly seems necessary as far as the Stations are concerned. Two cards for forestry subject matter since 1910, which date perhaps marks the beginning of American forestry literature, can be procured at a cost of around $150.

It may be of interest to the Stations to know that the current literature, the mimeographed list prepared monthly by Miss Stockbridge, is being issued in a rather large edition upon a postcard request. The response to this request has been far beyond our expectations.

Congress

As Congress assembles the early part of December, interest in legislation again becomes acute. The McSweeney Bill has been reintroduced by Congressman McSweeney and is known as H. R. 6091, while Senator McNary has introduced the bill for the first time in the Senate, where it bears the number S. 1183.

Allegheny Station

The headquarters of the Allegheny Station have at last been determined upon and the way paved for prompt settlement of this question. The Station is to become established in cooperation with the University of Pennsylvania, at Philadelphia, and the Station staff will probably be settled in their new quarters, 3438 Walnut St., Philadelphia, Pa., about the first of the year. A tract of land belonging to a consolidated group of Young Men's Christian Associations near Philadelphia has been selected as a headquarters experimental forest.

G. L. Schnur, from the Sitgreaves Forest, is joining the Station staff.

Library

During the month of November 958 books and periodicals were drawn from the library, and 155 members of the Service and others consulted the Library in person.

There were 228 books and articles indexed for the catalogue last month.

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NORTHEASTERN FOREST EXPERIMENT STATION

That the heavy rains which caused the disastrous flood recently in Vermont and New Hampshire were accompanied by strong winds in some portions of the region is evidenced by excessive windfall which has occurred on many of the cutover areas in the White Mountains. Westveld left on a trip to the north country before the crest of the flood reached Massachusetts and before the seriousness of it was generally realized in southern New England. However, he succeeded in evading the inundated regions and the worst of the washouts by detouring over back roads which follow the high country and reached his first objective, Campton, New Hampshire. Because of the breaking of the Parker-Young Company's dam on the Mad River, it was two days before he succeeded in reaching the permanent sample plots on the Waterville tract. The Parker-Young Company lost heavily in river driving and logging railroad improvements, as well as suffering considerable damage to their pulp mill near the junction of the two main branches of the Pemigiwassett river. Westveld eventually succeeded in reaching the experimental area at Cherry Mountain also. A general inspection of the methods of cutting plots established there in 1924 indicates that more windfall had occurred during the November storms than during the entire intervening period since their establishment. In connection with his study of the effect of seed bed conditions on the germination and establishment of spruce and balsam fir, Westveld established a large number of seed bed condition plots on the experimental area.

Behre compiled a progress report on the special increment study which was conducted on six white pine trees at the Harvard Forest during the summer. On these six trees the march of diameter growth throughout the season was recorded at breast height and at a point half way between tip and breast height by means of a steel diameter tape resting on brass supports fixed to the bark

and read to nearest .01 inch by means of vernier. The object of the study was to study the relative growth at the two points on the stem and change of form quotient in relation to weather conditions, especially wind movement, and in response to change of surrounding by thinning, or change of crown surface by pruning. Three of the trees were codominant individuals in a fairly crowded stand, such as might be expected to benefit most by a heavy thinning. Of these one was left as a check and the others released by thinning. One of the released trees was immediately prevented from bending in the wind by guy wires in four directions. The second group of three trees was full crowned dominant trees in fairly open position. One of these was left as check; the crown length of the second was reduced one-third by pruning; and two-thirds of the crown was pruned from the third tree.

In all six trees growth started earlier at breast height than at half height, but growth at the upper point later took the lead, and total growth for the season was much greater at the upper point than at breast height. No stimulation of growth this season could be observed as a result of thinning. Pruning off two-thirds of the crown length resulted in distinct reduction of rate of growth for the remainder of the season at both points on the stem. Growth takes place during the night for the most part, and diameters usually decrease during the day, unless the weather is wet. Fluctuations in growth during the season appear to be directly correlated to precipitation. Growth is stimulated by rainfall, and shrinkage usually occurs in dry periods.

The form quotient of all the trees increased during the season. The first season's growth demonstrated no effect of pruning upon change in form. The effect of thinning upon form is also indefinite, but increase in form quotient of the thinned trees was greater than for the check tree, with no discernible difference between the free and guyed stems. Neither growth nor change of form could be correlated with wind movement of air temperature in the preliminary study given the weather records.

It is planned to continue this study two more years, and it is hoped that dendrographs for continuous record may be secured to supplement the method of hand readings.

Gast spent two weeks in Eppley Laboratory in Newport, Rhode Island, during the month. For the last two years this laboratory has been developing thermopiles (Coblentz and Weather Bureau types) for the measurement of radiation. An attempt is being made to develop for commercial distribution the spherical hot junction thermopile devised by Gast. It is expected that the work of the Eppley Laboratory will shortly make available thermopiles capable of giving all the information on radiation which silvicultural research workers will need.

Stickel closed down the fire weather station at the Harvard Forest about the middle of the month, and with the assistance of Gottlieb and Chapman is engaged in the compilation of the data secured at the several fire weather stations during the summer.

Spaulding spent practically the entire month on the larch canker investigations. J. R. Hansbrough has been assigned to the station temporarily as assistant to Doctor Spaulding.

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CENTRAL STATES FOREST EXPERIMENT STATION

Favorable weather conditions allowed one party to continue its work in the field during this month. The balance of the staff was engaged in the office, largely in computation work.

Mr. Clapp spent one day at the Station on his way to Washington from the meeting at Madison, Wisconsin.

McCarthy and Day visited Wooster for a conference with the State Forester. While there, Day had the opportunity to examine some of the state plantations. He was especially struck by the excellent growth of Corsican pine which had over-topped by three feet adjacent test rows of red and white pine. The stands are about fifteen years of age.

Kellogg, who has been employed in Washington assisting in compilation of the Flood Study material, reported in Columbus during the month. Before leaving Washington he spent several days going through the compilation file selecting material for transfer to the Station files. This included several bibliographies bearing on the Ohio Valley region and a large number of woodlot reports.

Arrangements were partially completed during the month looking to the carrying out of the contract agreement between the Station and the University. Members of the Station staff plan to render some assistance during the second University quarter by giving a limited amount of instruction to classes and furnishing illustrative material for use in these classes.

It will probably be of interest to foresters to know that Ohio State University, which at one time gave a four-year course leading to a degree in forestry, now has a very small amount of in-

structional work in this subject, all of which is taught by one man, Norman W. Scherer. It is the intention of the University to maintain here only such courses as are essential to a general understanding of forestry by the graduates of the agricultural college. At the same time at least one of these courses will probably be open to the student body of the University. While the Station will not undertake to carry any material amount of instructional work it is highly desirable that graduates in agriculture, who are later to become farm bureau agents or hold other positions of public leadership, shall be sufficiently informed to understand the treatment of timber as a crop.

In carrying out this program, McCarthy addressed the freshman student body of the agricultural college and also appeared before the meeting of the horticultural club and the botany seminar. This Station is especially fortunate in having a very well conducted botany seminar under the direction of Prof. Transeau. Ecological subjects are given considerable prominence in seminar discussions.

Oak Study

Hanley, accompanied by Hills, was in Kentucky at the beginning of the month engaged in searching out and measuring yield plots in second growth oak. Their search extended through the lower Cumberland region in both Kentucky and Tennessee, and also through southern Illinois and Indiana, and the section of Missouri south of St. Louis. All of the areas visited were areas which had previously been clear cut for the production of charcoal.

While this trip served to acquaint us with the conditions of even-age stands in this section of our territory, it was not productive of material results because of loss of stands through fire damage and land clearing. All of the better agricultural land which had been previously cut clean for charcoal had been later put under cultivation. Successive fires had so far thinned many of the other stands that plots were not established in them. This may give the Station an opportunity, however, to determine the extent of fire damage in even-age stands in a future study. The records thus obtained will have greater value because of the study now being made on similar but undamaged even-age stands. One such area of 6,000 acres was found in Kentucky, and another large area in Missouri. In Illinois the party was accompanied by State Forester R. B. Miller.

The prevalence of tie cutting in these stands often renders them useless for yield study. It is significant that most of the second growth stands which followed the cutting for charcoal have already produced a crop of ties.

Work of computation of oak volume tables was carried on in the office by Day, Kellogg, and Bower. Some of this volume table work will be completed at the Station and part of it will be taken to Washington by Day for computation in that office. There is still considerable need for standardization of methods suitable for the preparation of hardwood volume tables. The feeling at this Station is that too great refinement should not be undertaken in the preparation of these tables until the factor of form is given more consideration in their preparation.

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APPALACHIAN FOREST EXPERIMENT STATION

General

The month was spent largely in the preparation of manuscripts and computation of the field data from the extensive survey of reproduction on cut-over hardwood areas. The revision of the "Timber Growing and Logging Practice" manuscript was started by Frothingham, and some preliminary work was done on the investigative program. McKinney's party on the loblolly pine study remained in the field during November.

Two more of the texts of the radio talks given last spring were mimeographed and distributed to the Station's mailing list. These were "Forest Fire Damage," by E. F. McCarthy, and "The Chestnut Blight," by Assistant Supervisor John W. McNair, of the Pisgah National Forest. Many appreciative acknowledgments of these papers have been received.

The Station had visits from E. N. Munns and L. H. Reineke, of the Washington Office and from R. D. Garver of the Forest Products Laboratory.

Tests of species in the spruce-fir type and in hardwood types

Buell, Scholz and Morey visited Mount Mitchell, examining and measuring the trees in the test plantations in the cutover

spruce area. Observations were made on those plots which were set out in the spring of 1925, 1926, and 1927. Some seventeen different species of conifers have been planted on the slopes of the Black Mountain range at elevations between 5,500 and 6,000 feet. The area, which originally supported a heavy growth of red spruce and southern balsam fir, was severely burned after it was cut, and because of light snowfall and exposure to severe winter winds now presents an unfavorable site for the establishment of a new stand. Experiments aiming to determine the reaction of various coniferous species to the conditions presented here were begun in the spring of 1923. None of the species tested so far has equaled in growth and vigor the two which are indigenous to the locality. Of the other tested species, pitch pine is probably the nearest rival to the red spruce and southern balsam fir, with Norway pine and Norway spruce following in the order of successful adaptability.

Hardwood and coniferous species have been planted in the Bent Creek Experimental Forest as well. These tests were begun in the spring of 1926, and all of the plots, some twenty-three in number, were examined during November.

Study of Cut-over Loblolly Pine Lands

MacKinney, with field assistants Nothstein, and Ziegler, continued the field work on loblolly pine at five points in eastern Virginia and nine in North Carolina. Strip tallies of reproduction were made and additional trees were bored in the study of comparative growth before and after cutting. While definite conclusions are not justified at this time, the work in November indicated that on poorly drained sites or "pocosons" loblolly pine reproduction following the logging of scattered pines from among hardwoods is not competing successfully with the hardwood reproduction; the stands seem to be tending toward pure hardwoods. On cut-over loblolly pine areas, especially on the drier sites, the method of skidding the logs seems to have had a pronounced effect upon the character and abundance of the reproduction. Areas that were said to have been horse skidded showed much more pine reproduction, most of which was advanced at the time of cutting, than otherwise similar areas said to have been logged by steam. The ill effects of fire were everywhere conspicuous on the burned as compared with the unburned cut-over areas examined.

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SOUTHERN FOREST EXPERIMENT STATION

General

The annual investigative program was mimeographed and distributed throughout the South.

During the first part of the month Munns and Wyman were both at the New Orleans office and visited the branch stations at Bogalusa, Camp Pinchot and Starke, being accompanied at the latter two by Demmon. W. R. Mattoon spent a day at the Urania Branch and offered several valuable suggestions for explanatory signs on our experimental plots there.

With Mattoon and Peters, members of the Station Staff at New Orleans discussed the possibility of obtaining closer correlation between extension specialists and the Station.

A topographic map of the Greeley Pasture and also a map showing the location of the plots at the Urania substation was completed by Barrett and Lloyd.

Miss Spuhler, Senior clerk, spent the latter part of the month at the Starke branch station, going over the files and getting better acquainted with the actual field work there.

Wyman attended a fire conference at Woodbine, Georgia, conducted by the Georgia State Forestry Department, cooperating with the James D. Lacey Company. An inspection of fire lines and a fire lookout system was made.

The whole staff was saddened by the death on November 30, of James Allen Wahlenberg, three-year-old son of Ethel M. and W. G. Wahlenberg.

Protection, Fire

Barrett and Wakeley remeasured the trees on the McDow Plot near Urania. This plot was established in 1924 in a 50-year-old stand of loblolly pine which had just suffered an extremely severe fire. Although no pines had been killed, analyses of the cores showed, that of the past six years diameter growth, 58% was made during the three years prior to the fire and 42% during the succeeding three years.

Among other interesting events at the Choctawhatchee Branch, Gemmer reports a rather unsuccessful experiment in building fire lines with a tractor and road plow. The plow clogged and hung up very easily, causing the tractor to "dig itself in" in the deep sands.

Management

Gemmer completed an outline for the coming year's work at the Choctawhatchee Branch Station and spent considerable time installing weather instruments.

Wahlenberg wrote up a memorandum on the "200 acre tract" at Bogalusa and also completed this year's seed distribution count in the longleaf seed catchers at McNeill.

Measurements

Demmon and Lloyd spent two days collecting data for site determination in longleaf pine on the lands of the Industrial Lumber Company near Elizabeth, La. Measurements of height and age of average dominants were obtained in six separate second-growth stands.

Naval Stores

With the close of the regular field season for chipping, dipping and scraping, Wyman reports the most productive turpentine year since the establishment of the Station branch. This was primarily due to the exceptionally dry season. Although favorable to turpentine production, the dry weather has resulted in the early occurrence of winter fires and it was found necessary to start raking around trees and building fire lines three weeks earlier than usual.

Several localities were investigated for additional turpentine tests and further plans for chemical investigations were made with Miss Gerry's help.

Forestation

Wakeley, with others of the Staff, completed the remarking of the experimental plantations at Bogalusa, using painted

iron fence posts. As a general rule wooden stakes have proven unsatisfactory in this country and in the future all plots will probably be marked with iron stakes to avoid the replacing of corners every few years.

Protection, Others

Grazing. At McNeill Wahlenberg collected a number of soil samples from the various plots and plans to make acidity, moisture, and density tests. The density will be expressed in terms of specific gravity and of pore space.

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CALIFORNIA FOREST EXPERIMENT STATION

General

The consolidation of the Office of Products of the California District with the Station has been approved by the Forester. Hill, Brundage, and the clerical force are moving into the Station headquarters on December 1. The consolidation brought about by the personal solicitation of Hill is a step towards bringing investigations of silviculture and products more closely together. Concentrated action by this enlarged staff will give impetus toward the solution of a number of our problems involving silviculture, products, and economics. The California staff welcomes Hill and his office force with keen anticipation of an enlarged and more profitable program of future work.

Through the splendid cooperation of Doctor Craighead and Mr. John Miller, of the Bureau of Entomology, Mr. Person has been assigned to the Station as Assistant Entomologist and is already comfortably located with us. We have been anticipating this assignment as a very necessary rounding out of our cooperative personnel.

These additions to the staff have necessitated enlarged quarters, which have been generously furnished by the University through the cooperation of the Forestry School. Seven rooms in Hilgard Hall are now in use by the Station.

The District Ranger School was held at the Feather River Branch Station from October 3 to November 12. Members of the Sta-

tion staff participated as instructors. Kotok lectured on "Fire Protection"; Hill on "General Forestry and Products"; Dunning on "Certain Phases of Management"; Siggins was in charge of field nursery and planting demonstrations.

An area of Government land on Jaw Bone Creek on the Stanislaus Forest has been examined as a possibility for a permanent natural area in the optimum sugar pine - yellow pine belt. This tract is at present inaccessible, but is likely to be opened up for timber sales in the near future. The Office of Management is cooperating in the general plan for setting aside sufficient areas in the characteristic forest types, and the Jaw Bone area is one of particular interest.

Some interesting work by Metcalf in southern California on the effects of windbreaks is of real significance to us in southern California. A series of anemometers placed near orange orchards protected wholly or partly by blue gum plantations show consistently three times as high wind velocity in the unprotected portion of the orchards as in the protected. High winds were recorded as follows: October 6, November 8, December 11, January 3. The anemometers in the open showed as much as 400 miles in 24 hours, while those set up 300 feet in the lee of a 65 foot windbreak recorded one-third of this total velocity. This leaves open for speculation what effect a continuous cover of trees or woody shrubs in the mountain regions of southern California have on wind reduction, transpiration, and fire weather.

Management

The field season was prolonged into November in order to permit completion of the preliminary work on the root study. Intermittent spells of bad weather interfered considerably with mapping, note taking, and photography. Enough has been accomplished to show that extremely interesting results can be obtained without the unreasonable expenditure of labor and funds which has hitherto been a limiting factor in such undertakings. A satisfactory combination of power pumps, nozzles, and other equipment has been worked out. Methods of procedure and objectives have by now been fairly well outlined. Sufficient material is at hand for a brief article on the preliminary results of this root study, which Dunning expects to complete shortly. Some time has been spent by Dunning in collecting literature and reviewing recent similar work elsewhere. About 150 references have been found dealing largely with work in a very limited field or confined to seedlings, because of the difficulties of excavating roots.

Some interesting material has been collected by Dunning which shows the lack of correlation between rainfall and diameter growth. Attention was directed to this subject by the failure of bark beetle epidemics to show the subsidence anticipated following the normal precipitation of this season. The probable explanation will be found not in the increased precipitation but in the retarded growth which is less than in the very dry season of 1926. The correlation between bark beetle attack and growth, as pointed out by Miller and Person, is common in the yellow pine. The reduced growth is apparently the result of subnormal spring temperatures and late spring frosts.

Entomology

A recent report by Person emphasizes the importance of insect losses on cutover areas on the poorer sites in the east side yellow pine type of northern California. On the section studied the loss has amounted to 1800 trees over 10 inches D. B. H., or 45 per cent of the volume left when the area was logged 22 years ago. Seventy per cent of this loss was caused by the western pine beetle (D. brevicomis Sec.). Growth rate studies and precipitation records indicate that much of this loss is probably the result of a marked deficiency of precipitation since 1917.

Some of the loss could have been prevented by a more careful selection of the trees that were left but on the site V areas even the most vigorous trees are susceptible to insect attacks during periods of extreme drouth such as we are now experiencing.

Cover Type

Wieslander has nearly completed the cover type map for the Sierra regions outside the National Forest boundaries. Unusual storms for this season of the year, even for California, abruptly terminated the work of two mapping crews in northern California. A very interesting series of photos of old cemeteries gives an idea of the original forest types. They remind one of the temple forests of China; the surrounding country has been logged off so completely and burned so severely that such protected spots as these are the only indices of the original vegetation.

Plans are under way to proceed on the cover type map in southern California this winter. Work will be started on the Angeles Forest with a crew of five men; three from the Angeles Forest, one from the State Forester's office, and one from the Station. Wieslander will have organized the work for this crew by December 1. Wieslander has also checked the type maps already completed on some of the National Forests, in order to secure uniformity and make corrections where new data is available.

Southern California

Work on the erosion study on the Barranca Burn has been pushed along in preparation for the stormy season which has already begun. An earth dam at the mouth of the burn, weirs and other instruments are in place. Up to the present 1-1/2 inches of rain has fallen, but no water has reached the reservoir. Kraebel and Lowdermilk have burned over some small plots to be used for detailed check studies as to the effect of cover and rain impact on subsequent seepage, run-off, and erosion. The special instruments devised by Lowdermilk are now being put in place.

At Devil Canyon nursery, preparations are being made to increase its capacity for next year, and to extend the work into woody shrubs and native hardwood plantings.

Fire

Two computers have been steadily at work abstracting data of all fires on California National Forests from 1921 to 1926. This material will be used by Show and Kotok in preparation of a bulletin. This period deals with almost 8,000 fires, and 46 recorded steps in the handling of each of these fires.

A final examination of the Snake Lake area which has been intermittently burned over since 1917. has been completed and will probably close this light burning experiment. Again, it was found that even under the most favorable conditions the area as a whole could not be burned over, and where burning did take place, it frequently destroyed all the new reproduction.

Kotok is participating as a member of the Board of Fire Review, which is visiting the Modoc, Lassen, Santa Barbara, and San Bernardino Forests.

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

Early in the month the Annual Western White Pine Blister Rust Conference, which two or three from the Station attended, brought to town a number of foresters whom we were glad to have a chance to see. A request has been made of the Office of Blister Rust Control to select the environs of the Wind River Station as one of their experimental control areas in order that the Arboretum may be given protection against the rust. The agents are now making a preliminary survey of the area with this object in view.

Munger spent a day at Corvallis interviewing the Forest School faculty and some of the Agricultural Experiment Station staff. In the evening he gave a talk to the entire Forest School in their log cabin on the school forest upon "The Function of a Forest Experiment Station." There have been requests for five articles from outside agencies during the month and the preparation of some of these has taken considerable of the Director's time. He also has had a share in preparing a report on forest taxation for the Portland City Club Committee on Taxation, of which he is a member.

Meyer left for the East November 20 via the California, Southwestern, and Southern Experiment Stations, at each of which he will spend a day. Before he left he broke in on the computing of the Douglas fir understocked plot data by F. L. Moravets, a former Junior Forester, who is carrying the work forward during Meyer's six weeks' absence.

Westveld has spent the whole month compiling his notes on slash disposal and methods-of-cutting plots. He finds on the western yellow pine slash disposal plots on the Deschutes Forest, which have been under observation for a year, some interesting results. The total germination of subsequent seedlings for the first year was nearly twice as great on the plot on which the slash was left as it fell as on the plot where the slash was piled and burned. Germination on the former was at a rate of 1100 per acre and on the latter 580. Germination was heaviest in the dense slash where seedlings occurred at a rate of 2900 per acre. Survival of seedlings on the slash covered plot was 43.6% as against 26.7% on the piled and burned plot. Loss of advance reproduction by slash or slash disposal was practically the same on the two plots, being about 8% of the total reproduction. This is insignificant when compared to the loss by logging which ran nearly 60%.

The first of November, Isaac seeded the intensive reproduction study plots in the upper Wind River Valley. This year the seeded spots were screened against birds and rodents to avoid the seedling shortage that was experienced last season. The remainder of the month was spent in the office except for the periodic seed collection from the traps at Scappoose and from the screened plots at Alder Creek. The sample plots at Alder Creek, screened against birds and rodents and seed from outside sources, were found to be heavily damaged by stock, which were unknown in the locality when the plots were put in. This is another instance of the unforeseen hazards of one kind or another to which long-time studies are subjected, and which must be allowed for.

The first half of the month Simson was occupied in winding up the season's work at Wind River and preparing the Station for another winter. The fails in the lowland white fir and yew groups in the Arboretum were replaced with wild stock and a group of western hemlock was planted in the Arboretum nursery.

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NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

The data on lightning storms in this region is accumulating very rapidly. We now have approximately 7,000 observations on storms, made on the standard report form which has been in use beginning with 1924. The material for 1924 and 1925 has been analyzed and a report published. Analysis of the 1926 data is now almost finished, and coding of the 1927 data is to be commenced in December. With the completion of a 5-year period in 1928, there should be abundant material as a basis for a very detailed report. Many of the facts discovered by the preliminary work are already being used by the protective organization. With further corroboration and refinement, additional progress is certain to be made.

The month was extremely unfavorable for both Marshall and Kempff, who are still on field work at the Priest River Experimental Forest.

Early in the month a permanent sample plot, laid out last autumn in a western white pine timber sale of standard marking, was given its first annual re-examination. A total of 249 living trees, exclusive of 19 girdled hemlocks, had been left on five acres. During the first year 32 of these trees died. This might seem to be an appallingly high percentage of death, but closer analysis indicates that three-quarters of the mortality was among hemlocks, cedars, white and alpine firs, which had been scorched in brush burning. Most of them were defective or cast undesired shade, so that their death was really in accordance with brush disposal. Five trees, including three white pines, were lost through windfall or breakage, but all of these were defective, crooked, or leaning heavily, and should never have been left. The other three deaths were among trees which were unhealthy at the time of logging.

On this plot there were nineteen hemlocks from 16 to 34 inches in diameter which were girdled in 1926. Only three of these were dead a year later, of which one had probably died of fire injury rather than through the cutting of its cambium. The most in-

teresting point in connection with these trees is the heavy crop of seed which they bore. All the trees in the plot were rated as to cone crop, the terms of classification being good, fair, poor, and none. The only trees in the whole area to fall in the first category were girdled hemlocks, seven of this class of trees having good cone crops. If this is characteristic of girdled hemlocks, it is an important consideration in connection with present timbersale practice. One of the reasons for girdling large hemlocks is to get rid of them as a seed source. But if the girdling stimulates seed production, then it is obviously destructive of one of its major purposes.

These girdled hemlocks exhibit another interesting phenomenon. The three trees which bore a good seed crop in 1926 had either a poor one in 1927 or none at all. On the other hand, of the seven trees which had poor crops in 1926, five produced good crops in 1927.

Kempff and Marshall also spent several days sowing seed of western white pine, larch, Douglas fir, white fir, red cedar, and Engelmann spruce in the duff. Eight areas of a square foot were sown with seeds from each of these trees, a thousand seeds being sown to the square. The beds were covered with 16-mesh wire cloth, laid flat on the duff to keep out subsequent seeds and rodents. It is proposed to take up one sample of each species annually for the next eight years, recover the seeds, and germinate them in the greenhouse. Thus we will find how long the seeds of the different species will remain viable when stored in the duff. Experiments with the same objective had previously been tried by Brewster and Larsen, but due to faulty technique and other troubles had proven partial or entire failures. We have tried to profit by their errors.

A small permanent yield plot was also established in a stand 29 years old. The plot has a relatively small percentage of white pine in the dominant class and this fact constitutes its chief interest. It is important in blister rust control to know whether a sufficient share of the non-dominant white pines will survive. It is desired to determine the number of white pines per acre which will represent enough value in a 100-year rotation to justify Ribes eradication during the early life of the stand. For this stand, with 40 dominant white pines per acre, the indication is that plenty will remain at maturity, but re-examinations alone will give a definite answer. However, where there are more shade-causing species than found here in the dominant stand, or where white pine forms a smaller percentage of the trees, it is very doubtful whether enough white pine would live to maturity.

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SOUTHWESTERN FOREST EXPERIMENT STATION

Krauch and Lexen returned early in November from a two months trip through New Mexico where sample plots were remeasured on the Carson, Gila and Lincoln Forests. Plantations on the Santa Fe were also examined.

Lexen and Pearson tagged and measured two thinning plots on the south end of the Coconino. All of the thinning plot data are being recorded on the standard sample plot forms.

Poisoned grain has been scattered over the western yellow pine sample plots on the Coconino and Tusayan as a precaution against repetition of the mouse infestation which seriously damaged reproduction on several of the plots last winter.

Pearson has written a paper entitled "The Measurement of Physical Factors in Silviculture" for presentation at the Nashville meeting of the American Association for the Advancement of Science during the last week of December.

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ROCKY MOUNTAIN FOREST EXPERIMENT STATION

November Activities

On November 1 the Forest Supervisors of District 2, in conference at the time in Colorado Springs, took occasion to visit the Fremont Field Station. It was a memorable occasion, not only because these men constituted the largest group of technical foresters ever to visit the Station, but because it offered the best possible opportunity for getting in actual contact with the administrative personnel, for whose use most of our local research work is being conducted. The more important field experiments were visited, and the fundamental studies in the greenhouse were explained. The practical application of the various experiments was emphasized as much as possible, and to all appearances most of the Supervisors, and especially those who have silvicultural problems in need of solution on their own Forests, went away with a more liberal conception of what research in forest problems means for practical management and administration.

The data for the relation of grazing to erosion, planting, and natural vegetation experiment on the Pike Forest were worked up, and a progress report, covering the results of nine years study, prepared. Conclusions to date indicate that protection from grazing on this area has affected very little the composition of the vegetative cover, and only to a very moderate extent, the density of this cover, which is increasing more rapidly under fence. Overgrazing in recent years has not been as noticeable as formerly, but because of the character of the soil, which is composed of porous, loose and shallow disintegrated Pikes Peak granite, and supports a rather open cover of vegetation only, even limited use for grazing leaves telltale effects on the ground. Early conclusions in this experiment were to the effect that grazing, by reducing competition, favored survival of planted stock better than no grazing, but this conclusion is not wholly justified. Certainly, no effect on growth one way or the other is apparent. However, erosion, as determined from measurements made at various points, is more active on the unprotected area. A more rapid widening of washes and gulleys and the movement of more soil material in the drainage bottoms are apparent, and this is due in part probably to a more open soil cover on the grazed area and partly to the presence of cattle. The western yellow pine trees, planted in 1919, cannot as yet be said to be a factor in controlling erosion, and it is evident that in this phase of the experiment long-time study is demanded.

December Activities

Tabulating and summarizing the thinning in Douglas fir sapling stands (Mt-161), involving two sets of plots on the Pike, were started at the end of the month and will engage most of Roeser's time in December. This study has as a side feature, the determination of occurrence, spread and damage occasioned by the, as yet mysterious, pitch-girdle, which is so active in the Jarre Canyon region of the Pike.

Four brief visits were paid the Fremont Station during November for the purpose, primarily, of checking up on the moisture requirements and soil nutrient tests under conduction in the greenhouse, and to supervise the work of the new caretaker.

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Manuscripts

Northern Rocky Mountain

Effect of the Amount of Seed Sown and the Density of Seedlings on the Later Development and Survival of the Western Yellow and White Pine and Engelmann spruce. W. G. Wahlenberg.

Field Survival Studies, Season 1925. W. G. Wahlenberg.

Experiments with Classes of Stock Suitable for Forest Planting in the Northern Rocky Mountains. W. G. Wahlenberg. (For Jour. Agr. Research).

Prolific Seed Production in the Forests of Northern Idaho. R. H. Weidman. (Northwest Science).

An Investigation of Lightning Storms in the Northern Rocky Mountain Region. H. T. Gisborne. (Northwest Science).

California

Methods of Cutting Study, Plumas National Forest. Progress Report 1925. H. W. Siggins.

Thinning Young Woodlands. Duncan Dunning (1927 Yearbook).

Methods of Cutting Study, Shasta National Forest, Calif. Progress Report, 1925. H. W. Siggins and A. E. Wieslander.

Pacific Northwest

Rates of Growth of Immature Douglas Fir as shown by Periodic Remeasurements on Permanent Sample Plots. W. H. Meyer. (Sent to J.A.R.)

Pulpwood Farming and Forest Research. T. T. Munger. (Pacific Pulp and Paper Industry).

Southern

The "Same as Preceding." Note by P. W. Wakeley. (Jour. of Forestry)

Turpentine Damage in Slash and Longleaf Pine Stands. V. L. Harper (Forest Worker).

In Print

Behre, C. Edward - "Form-Class Taper Curves and Volume Tables and their Application." Jour. of Agr. Res., October 15, 1927.

McCarthy, E. F. - Forest Cover as a Factor in Flood Control. (Proceedings, The American Society of Civil Engineers, December, 1927.)

I. V. Anderson Joins the D-1 Products Office Staff

Mr. Anderson of the Kaniksu Forest(D-1) was selected to fill the position formerly held by M. Bradner, whose promotion within the Products Office followed Mr. S. V. Fullaway's resignation. The transfer to the District Office was made November 10.

Mr. Anderson was graduated from the Forestry School of Michigan State University in 1920 and received his first regular appointment as Ranger on the Cabinet Forest(D-1) the same year. In 1921 he received his technical appointment as Forest Assistant on the same forest. As a member of the Forest Supervisor's staff, Mr. Anderson specialized in range appraisal, planting, and forest management work. During this time he worked up and completed a management plan covering the white pine type on the Cabinet Forest. In August, 1925, Mr. Anderson was selected to fill a vacancy in the D-5 Products Office at San Francisco. There, besides general Products work, the Little-Used Species (White Fir) Project was assigned to him. In May, 1926, Mr. Anderson transferred back to D-1, coming to the Kaniksu Forest as Assistant Supervisor. Here he was in charge of the trail and protective improvement program, continuing with this work until his recent promotion.

As a member of the Products Office, Mr. Anderson will be assigned primarily to lumbering problems. He will inaugurate and help to carry out the Woods Utilization Study project, which will become the major project during 1928-29. Mr. Anderson's training and experience in the North Idaho and Western Montana lumbering region have been excellent preparation for this sort of work.

Mr. Bradner Visits D-6

Early in December Mr. Bradner spent one week with the District 6 mill scale crew on a project at La Grande, Oregon. The project was a cooperative affair between the Forest Service (represented by the D-6 Products Office) and the Mt. Emily Lumber Company of La Grande. The crew, in charge of Mr. W. Gibbons, was made up entirely of D-6 Products and Management men, with the exception of the two lumber graders. The primary object of the study was the collection of detailed data for determination of the overrun obtainable in western yellow pine logs in the east

Oregon district. Besides the basic data for such a study, very excellent data were being obtained on methods of cutting at the headsaw, utilization throughout the sawmill, mill waste, percentage of grades cut out, and log grading.

Mr. Bradner assisted as extra member of the crew in helping the study to get under way. Due to the crew personnel, the sawmill layout and the fine cooperation extended by officials and workmen of the lumber company, the work progressed splendidly. The work was particularly instructive to Mr. Bradner as it gave an excellent opportunity to study methods and utilization in a sawmill in the Oregon district. From personal observation, which is not backed up by sufficient actual data, it appears that this mill does not cut and utilize with the same degree of care common to the same type of pine mills in District 1.

From La Grande, Mr. Bradner went on to Portland where two days were profitably spent in meeting and getting acquainted with officials of the Western Pine Manufacturers Association, the editorial staff of the Timberman, and the District Office personnel.

Lumber Prices and Movement

Prices	First Q. 1927	Second Q. 1927	Third Q. 1927	October, 1927
Idaho White Pine	$38.48	$38.41	$36.77	$35.04
Pondosa Pine	26.28	26.72	25.97	24.03
D. Fir and Larch	17.62	18.92	18.83	18.16
White Fir	16.46	18.02	18.56	18.65
Spruce	23.77	24.09	23.34	23.80

	November, 1926	November, 1927.
Cut	153,922	124,433
Shipments	162,503	141,376

Fourth Biennial Census of Manufacturers

Preliminary arrangements have been made for the continuance of cooperative work between the Forest Service and the Bureau of the Census, in connection with a census of the products of manufacturing industries for the year 1927.

The 1927 canvass will not only include all of the sawmills in this District, but also cover establishments engaged in the manufacture of other timber products such as saw logs, cedar poles, round mining timbers and hewn ties. New lists of the miscellaneous timber operators are now being received in response to a circular mailed on November 10, to all Forest Supervisors in the District. The revised sawmill lists which are regularly called for as an annual report from the Supervisors are also coming in.

Two lists of sawmills based on the 1926 reports for Idaho and Montana, and 2500 Department of Commerce envelopes were received from the Bureau of the Census on November 22. If the printed schedules and instructions are furnished before the end of the year a very early start will be made on the Idaho-Montana canvass. Mr. Whitney will be in charge of canvass.

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OFFICE OF FOREST PRODUCTS - District Five

San Francisco Bay Marine Piling Committee

The final report of the Committee was finally received from the printers and distributed. There has been much favorable comment upon the report and it is hoped that it may accomplish results commensurate with the long draft which has been made upon the Products resources. The Committee was formally disbanded with a closing banquet.

Wood Identification

An interesting determination of wood species was made during the month for Professor Chaney of the Department of Paleontology. This was a piece of wood in an excellent state of preservation recovered with a pleistocene deposit on Santa Cruz Island off the California coast southwest of Santa Barbara. It turned out to be Douglas fir, and shows that 100,000 or more years ago Pseudotsuga taxifolia was distributed much farther south than its present range. At the present time there are only dryland oaks and similar xerophytic species, for the most part shrubby, on that island.

Laboratory Redwood Project

Mr. Luxford of the Laboratory finished his work in Humboldt County and called at the District Office and the Experiment Station on November 14 and 15. A thorough discussion of the status of the project was made with him by Kotok and Hill.

Heptane

Work on the data and the preparation of a report has been making good headway. A very sharp correlation is shown between the occurrence of yellow and Jeffrey pines, respectively, and the type of soil in that region, and a diagrammatic cross-section of the region prepared by Mr. Tihomiroff shows a number of very interesting phases.

Fungimors

Mr. Brundage went to Pinedale on November 6 and spent several days with the Sugar Pine Lumber Company in dipping some 30,000 feet of western yellow and sugar pine lumber for the winter blue stain tests. The boards were immersed for different periods from five seconds to 4 minutes, the time in solution being regulated closely in order to determine the minimum which will produce satisfactory stain prevention. The method of dipping to be used and the design of apparatus for treating lumber on a commercial scale will depend fundamentally upon the length of immersion period necessary. Treated lumber was piled in the company yard adjacent to piles of untreated control stock from the same run of logs and will be left until early spring. Each board will then be carefully inspected for stain in both rough and surfaced condition. Mr. Brundage prepared a detailed report of the work done to date and a copy was forwarded to the Laboratory.

Termites

Termite trouble appears to increase in San Francisco and the Bay Region. A San Francisco apartment house was examined by Mr. Hill during the month in which severe attack by Termopsis will require heavy reconstruction.

Census

The National Forests of the District were circularized for revision of the sawmill list. Envelopes for the census inquiries have been received from Washington, but no forms.

Changed Headquarters

At the last of the month the office moved over to the California Forest Experiment Station at the University of California, and the two major lines of research work will hereafter be joined. Arrangements for the new alignment and the accomplishment of the physical transfer have taken much time and thought, but it is believed that the move will greatly benefit all the research work here.

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OFFICE OF FOREST PRODUCTS - District Six

Branch of Research

Degrade Study, Kiln-dried Douglas Fir. - Reference was made in last month's report to the degrade study in connection with the kiln-drying of Douglas fir Common at the plant of the Oregon-American Lumber Company, Vernonia, Oregon, in cooperation with that Company and the West Coast Lumbermen's Association. During the month Johnson brought the report to completion; copies were submitted to the Director and the Forester. The report shows that progress is being made in the kiln-drying of Douglas fir Common, in reducing the degrade and bringing the stock to a more or less uniform moisture content.

The study included two kiln runs of one-inch and two of two-inch Douglas fir Common and one run of one-inch Douglas fir Finish. The one-inch Common included 6, 8, 10 and 12-inch widths; the two-inch, 4, 6, 8, 10 and 12-inch widths; and the one-inch Finish 8, 10, 12 and 14-inch widths. The drying was done in a commercial type of internal-fan kiln.

A 48-hour drying schedule was used with both the one and two-inch Common, a constant dry-bulb temperature of 125° F being maintained in the case of the one-inch, and 175° F in the case of the two-inch stock. A 152-hour schedule was used in the case of the one-inch Finish, starting at 150° F and finishing at 170° F.

The average kiln-dried moisture content of the stock was: One-inch Common 20.3 per cent; two-inch Common, 22.9 per cent; one-inch Finish 9.1 per cent.

The degrade occurring in the various grades and thicknesses of Common was:

Grade	Thickness	Degrade		
		Drying	Machining	Total
No. 1 Com.	1-inch	0.77%	8.34%	9.11%
No. 2 Com.	1-inch	1.85%	2.22%	4.07%
No. 3 Com.	1-inch	0	0.46%	0.46%
No. 1 Com.	2-inch	1.68%	1.55%	3.23%
No. 2 Com.	2-inch	2.09%	1.45%	3.54%
No. 3 Com.	2-inch	0	0	0

Mill Utilization Study. - Reference was made last month to the mill utilization study to be made at the plant of the Mt. Emily Lumber Company, LaGrande, Oregon, largely in connection with western yellow pine. The study started November 7 and was completed November 19. A detailed record was kept of the character, grade and amount of material sawed from 2600 logs, mostly yellow pine. The field party consisted of ten men, including two lumber graders, three men from the office of Forest Management, Mr. Bradner, Office of Forest Products, District 1, and the four members of the local office of forest products.

The data secured from this study is now being worked up. It is felt that much information was secured that will be of value to the industry at large. The information secured will also be of value to the Office of Forest Management as a check on Forest Service scaling methods, also the amount of over-run that may be expected from certain classes of timber.

Test Material. - During the month Spelman shipped to the Laboratory two cars of high-grade Sitka spruce and Douglas fir logs for use as test material. The shipment consisted of three spruce logs 54, 65 and 74 inches in diameter and 16 feet long, respectively, and one 54-inch Douglas fir log 18 feet long. The three spruce logs scaled 9500 board feet and the Douglas fir 2460 board feet. These logs were secured from the Pacific Spruce Corporation at Toledo, Oregon.

General Wood Waste Survey in the Douglas Fir Region. - Progress is being made in the compiling of the field data secured in this study.

Cooperation.- Hodgson and Spelman are at present assisting the Office of Lands in compiling data on the taxation study of the National Forests as requested by the Forester.

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RANGE RESEARCH

WASHINGTON

The main effort during the month of November was endeavoring to get from under the pile of work confronting Mr. Chapline upon his return from his summer field trip.

Trip to Chicago

Mr. Chapline spent the period from November 24 to December 2 on a trip to Chicago. The first two days were taken up with attendance at the meetings of the American Society of Animal Production. This society made final plans for the formation of a western section to be made up of men interested in the western animal production problem. It is planned to have an annual meeting somewhere in the West, the first one being scheduled for September 1928 in connection with the field day which the Bureau of Animal Industry plans to hold at the U. S. Range Livestock Experiment Station at Miles City, Montana.

The rest of the period was spent mostly at the International Livestock Exposition. The Department exhibit was unusually good this year and brought a great deal of comment from the visitors. The Forest Service exhibit carried as much, or more, space in the news than any other feature of the exhibit. The following news item was one which refers specifically to it:

"It's pretty hard to get down to such matter of fact material as feeds and feeding after that hectic hour at the ringside, but there's a lesson being taught over in the Department of Agriculture that simply can't be passed up. Many farmers have thought for years that a cow couldn't graze too much. The Department says she can - and the Department knows. In fact, they prove it. Demonstration proves that overgrazing means feed shortage, thin cows, a 53 per cent calf crop and a 10 per cent death loss. The result is stunted calves and low prices, with a net loss of 5.8 per cent. Conservative grazing means abundant feed, fat cows, a 78 per cent calf crop and only a 3 per cent death loss, bringing a 7.4 per cent profit. There you have it. The difference between profit and loss. Or, if you'd rather, success and failure."

Approximately 15,000 copies of the leaflet printed to accompany the Forest Service exhibit were distributed, and the supply of other Forest Service publications at Chicago was exhausted.

There was an especially good display of fat stock and feeders this year. Of course in the breeding classes, there was the usual excellent quality, a number of western exhibitors coming in on the prizes.

While in Chicago, Mr. Chapline spent part of one day with Mr. J. S. Campbell, who is in charge of the Market News Service of the Bureau of Agricultural Economics there, considering the work of that Bureau, but more particularly in getting a line on classes and grades of livestock and the present values of these different classes and grades on the Chicago market. He also took advantage of the opportunity to become acquainted with the work of the numerous organizations, working on various livestock problems.

At the Institute of American Meat Packers Mr. Chapline discussed range research with the heads of a number of the departments and learned of their work. He was particularly interested in the work of Dr. W. Lee Lewis in charge of the Department of Scientific Research, Mr. Homer R. Davison in charge of the Department of Waste Elimination and Livestock, Dr. C. R. Moulton in charge of the Department of Nutrition, Mr. Hardenburg in charge of the Department of Public Relations and Dr. Filby in charge of industrial education.

Col. E. N. Wentworth and Dr. Rudolph A. Clemen of Armour's Livestock Bureau and Mr. E. J. Madden of Armour's hide department, were visited. They showed much interest in range research and a request was made for a complete set of our publications for their library. We will also receive regularly the Monthly Letter to Animal Husbandmen. This should be requested by each of the range stations if it is not now being received.

The work also of the National Livestock and Meat Board and the economic research of the International Livestock Exposition were considered with Mr. R. C. Pollock, the secretary of the former and Dr. Ellinger of the latter.

At the dinner at the Saddle and Sirloin Club, the Club's medals were presented to essay contest winners. The essay this year was on the subject "Value of a financial record on the livestock farm." The judges' comments on the essays seem so appropriate in the preparation of any article, or even longer manuscript, that they are of value to all of us who are attempting to write. They are, therefore, quoted almost in full:

"In the first reading of the manuscripts it was quite easy to select about one-third as standing out from the rest. They were written in clear, concise style, showed a good grasp of the subject and employed argument and illustration more or less frequently and effectively. The remaining two-thirds failed in one or more of these points. The weakest papers were wordy, awkward in construction and conveyed little original thought. Such papers discussed the question loosely and employed no illustrations when it is obvious that there is an abundance of such matter. ****** illustrations are the most effective way of clinching a point. A number of papers simply stated that cost records would do this or that, but did not show how. Some papers were top-heavy with descriptions of the mechanics of record keeping and gave little or no space to show they would help the farmer. Some also used space to no gain in condemning farmers for not keeping records.

"The first choice was made for the reason that the author wrote well and developed his theme the most completely. He not only showed the value of records from a business standpoint, but stressed their value in giving dignity to farming as an occupation and bestirring in farm people a greater respect for rural life.

"Ranking papers thereafter were mostly well done, showed a good grasp of the subject and ability in presenting it, and contained frequent evidences of originality."

Visitors

Director James T. Jardine of the Oregon Agricultural College, formerly in charge of the Office of Grazing Studies, came by for lunch and a couple of hours conference. He is still extremely interested in range research and particularly in its further development.

Dr. A. E. Romyn in charge of animal husbandry research in the Union of South Africa, and Dr. R. R. Staples in charge of grazing research in the Union, completed their tour of the United States early in November and spent considerable time in the office and in consultation with other members of the Department of Agriculture. Dr. Romyn made a special study of the organization of the Department while here with a view to adapting desirable features of our organization to that of the Department of Agriculture of South Africa.

Publications

Mr. Chapline completed an article for The Producer series "Watershed protection on cattle ranges." The bulletin covering the range economic survey in the Southwest prepared jointly by the Bureau of Agricultural Economics and the Bureau of Plant Industry was reviewed early in the month and returned to them.

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FORAGE INVESTIGATIONS

Plant Routine

Six collections, representing 543 specimens, were forwarded to the Bureau of Plant Industry during the month for identification. Eight collections, representing 281 specimens, were reported on to the field. Eighty-seven prints of economic-notes cards were forwarded to the field. Over 600 specimens were filed in the herbarium. Three hundred and thirty-seven plants were mounted.

Office of Horticulture Interested in Native Potatoes

On November 16 Dr. Charles F. Clark, Associate Horticulturist, Potato Investigations, Office of Horticulture, Bureau of Plant Industry, called to examine our herbarium material of tuberous-rooted solanums. He is eager, if possible, to get Forest Service officers in District 3 to collect for him mature seeds, or living tubers, or both, of solanum fendleri and solanum jamesii.

Townsendia montana Jones has hitherto been know only from Utah. Mr. H. E. Schwan's specimen No. 11, our serial No. 52571, collected July 19, 1926, at the top of Mt. Jefferson on the Madison National Forest, is a first record from Montana and a remarkable range extension. Dr. Blake has asked for deposit of part of the material in the U. S. National Herbarium.

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DISTRICT 3

Storms over the Colorado Plateau cut short the summer field season. Fortunately the work contemplated on the project of range management in the western yellow pine saw timber type was practically complete. The force left the Southwestern Forest Experiment Station for winter headquarters, Roosevelt Arizona, November 1. Due to road conditions the direct route across the Coconino Forest and via the Tonto Basin had to be abandoned for the longer route via Phoenix and Superior. On arrival in Roosevelt the office was changed from a room in one of the Service dwellings to a one-room tent house secured from the Water Users Association.

The period November 7 to 24 was spent in quadrat and other vegetative work in the field. Work on the browse range project becomes the active issue for the winter.

The seasons of 1927 have resulted in very good production of the ranges of the semi-desert and chaparral types. Growth and duration of feed produced by winter and spring annuals was above the average; was followed by heavy production of spring growing perennial grasses and shrubs. A second growth of most grasses that produced in the spring, good development of the native grama grasses (six species) and a vigorous condition of browse was the result of fall and summer precipitation. The plants of arid regions have wonderful powers of recuperation. This property has given rise to the popular opinion that rain is the one factor necessary for complete revegetation. It is quite probable that every old dormant grass root has made itself perceptible on the partially depleted range this season. Such seasons allow for a reasonably accurate inventory of vegetative assets.

The effect of the summer rains further emphasizes the necessity of securing herbaceous vegetation in normal abundance as supplementary ground cover where browse alone is not sufficient to prevent abnormal erosion. Active, continuous erosion of built-up soils is in abnormal degree indicative of insufficient cover or loss of cover. The case of destructive erosion on the brush range of the Southwest is decidedly one where loss of herbaceous vegetation is largely responsible for the disturbance. The indications are strong that management of southwestern browse range should be based on the effect that utilization of browse may be expected to have on the herbaceous vegetation and not on a probable carrying capacity of browse over a period of years.

Cooperrider spent November 24 to 27 in Phoenix in conference with Messrs. Kerr and Hussey of the District Office and Supervisor Swift. The administrative officers were working out a tentative fencing and allotment plan for the Tonto Forest. Research was asked to participate in establishing a basis of stocking and management for the various browse types.

Dr. Taylor of the Biological Survey, Division of Biological Research, was a working visitor from November 28 to December 2. The cooperative bio-ecological project, for which Dr. Taylor is handling the rodent side, promises to show the relation of the biota in forest, watershed and range protection and management.

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DISTRICT 6
(October and November)

October was spent by Ingram on current recheck work on the grazing management of cut-over lands projects on the Columbia, Siskiyou, and Crater Forests. November was spent in computation work on the same projects.

An interesting feature on the Siskiyou was the results secured with a small band of sheep grazed for the first time on the Powers sale area cut over in 1918 to 1920. The study of grazing on this cut-over area has been limited to cattle grazing. The success of small flocks of sheep using cut-over range on the adjacent ranches was responsible for an application to use forest range of this type. This was allowed in 1927. In a note in the November "6-26", Ranger L. J. Cooper states that with this trial band losses from predatory animals were few and "Their cooperation in fire protection was perfect and the good done in trampling fire lines through dense salal growths was fine to see."

Columbia 1927 Results

Comparative tests were initiated in 1927 which were designed to show the relative gains in weight of lambs and dry ewes to be expected on Douglas fir cut-over range in comparison with those normally made on typical Cascade and Blue Mt. high ranges. This was an expansion of the weight tests made last year on the Columbia with lambs alone.

In view of the innumerable and conflicting factors which enter into this question of the relative fattening qualities of a range, we were fortunate in the cooperator, Mr. Ed McGreer, who used this Columbia cut-over range in 1925 and 1926. With 4500 head under one ownership, and permits also on the Santiam and Ochoco Forests, the selection was possible of ewes and lambs of similar breeding (crossbred merino ewes bred to Lincoln bucks) wintered and lambed under similar conditions and grazed during the summer for the same general period of use.

From each of the bands grazed on these three Forests - Columbia, Ochoco, and Santiam - were selected 2 average dry ewes. These were given a separate brand and weighed for future checkweight at the close of the grazing season. Fifty lambs were likewise selected and similarly marked and weighed from each of the 2 ewe bands to be grazed on the Ochoco and the Columbia.

At the suggestion of the cooperator, the first weights were taken as the sheep left the ranch rather than when they reached the summer range. It was hoped this might reflect with reasonable accuracy any shrinkage resulting from trailing to the Cascade and Ochoco ranges as compared with lambs shipped direct to the Columbia. Weights were again taken as the sheep left their allotments.

Following are the comparative results secured.

LAMBS

Total Weights for 50 Lambs	Columbia pounds	Ochoco pounds
1. Upon entering Forest	2580	2432
2. Final weights leaving Forest	3350	3400
3. Total increase in weights	770	912
4. Average increase in weight per lamb (i.e., seasonal gain made per lamb)	15.4	18.36
5. Final weight per lamb	67	68

2.96 lbs. per lamb more gain on Ochoco range than on Columbia range in 1927; 1 lb. difference in final weight.

DRY EWES

Total Weights for Dry Ewes	Columbia For 10 ewes	Santiam For 50 ewes	Ochoco For 10 ewes
1. Upon leaving ranch	955	4330	1040
2. Final weights time of leaving Forest	1060	5500	1100
3. Total increase in weight	105	1170	60
4. Seasonal increase in weight per ewe	10.5	23.4	6.0

An important handicap in the use of the Columbia range not shared by ranges on the Ochoco and Santiam exists in the shipping charge. This was $550.00 for the Columbia band, or 46.6¢ per ewe and lamb. To properly justify this additional expense at current prices, a gain of 5 pounds per lamb above normal weight would be necessary. As a matter of fact, as the table shows, practically three pounds less gain per lamb on the Columbia was actually made in this test than was made on the Ochoco. (The Columbia lambs, it will be noted however, weighed at date of sale within a pound of those from the Ochoco, being sold in joint shipment at the same price, 10¢ per lb.) The Columbia weights were likewise 5½ lbs. less than the average gain made on this same range for a similar period (94 days) in 1926.

On the contrary, it will be noted that 4.5 pounds greater gain was made with the Columbia ewes than with those on the Ochoco, while on the Santiam a gain nearly double that on the Columbia and nearly four times that on the Ochoco occurred.

Growth of the yearling ewes on the Santiam, coupled with the fact that this was entirely a dry band, doubtless played an important part in the greater ewe weights for that Forest. The better management of the stock should properly be credited also with part of this gain, so that the Santiam ewes should not properly be considered.

On the Columbia, the difficulties experienced with bear in 1927 without doubt materially influenced the results secured there. During the last three weeks of the season the sheep were badly scattered, nervous, and put on little flesh. Driven by the huge fires which occurred on the Columbia in August on three sides of this allotment, with a short huckleberry crop, repeated attacks by bear on this band of sheep occurred, with the result that 75 head were actually killed, with a total summer loss, including strays, of 107 head (4¾ per cent of the total number grazed). No

such loss from bear occurred on this range in 1925 and 1926. Several bears were killed by the herders, which later, due to the unfavorable game laws in the State of Washington, resulted in a game trespass case involving the payment by Mr. McGreer of $55.00 and costs.

Losses on the Ochoco and Santiam bands this year were about normal.

While the tests were planned with a view to indicating the difference (if any) in the quality of the three ranges, it could not, of course, eliminate differences which occur in the actual management of the sheep, a variable always present to upset really definite conclusions.

Granting that management of the Columbia range is no easier than that on the other two forests, and making due allowance for the trouble with bruin, it must be acknowledged that handling of the sheep on cut-over land during the summer of 1927 was considerably below the standard maintained on the other two forests.

All things considered, the results secured on the Columbia range in 1927 in comparison with ranges of known merit on the Ochoco and Santiam were not very flattering to the former. One season's results will not give a final answer. Unfavorable years occur on the best ranges; 1925 and 1926 results on the Columbia were more favorable than those secured on the other two ranges, though we had a less accurate measure of results in those years.

The results to date, it is true, do not indicate any superiority of cut-over ranges over others. Making due allowance for the newness of the range, the unusual conditions which prevailed in 1927, and balancing this season's results with those of 1925 and 1926, it can safely be asserted that cut-over ranges similar to that on the Columbia are equal in productivity to summer ranges elsewhere in the District. It is doubtful if they can successfully compete with them, however. As a rule, use of Douglas fir cut-over ranges, with the attendant high shipping costs, will be in demand by large flock owners only where more desirable summer ranges closer to winter grazing lands are fully occupied and scarcity of summer range develops.

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JORNADA RANGE RESERVE

Range Conditions and Precipitation

Although no precipitation has fallen this month, a few fall weeds are starting. The weather has been very mild and enjoyable.

Condition of Stock

The breeding herd is doing well, and calves are in excellent condition for delivery on December 1.

Improvement Work

The new 7,500 gallon tank for domestic water is giving complete satisfaction. The installation of the 60,000 gallon stock water tank and tubs at Headquarters has been completed. This will make a fine place for swimming next summer.

The ranch crew spent the last two weeks of the month in rebuilding the horse pasture fence.

Investigative Work

Loose ends of field work have been cleaned up, and the data collected during the past season are now being compiled. The outline for the Annual Report was prepared and forwarded tothe Washington Office for approval.

The fifteenth Jornada Plant Collection, consisting of 122 specimens, was forwarded to the Washington Office for identification. It is hoped that this collection will add several new species to the Forest Service Collection, and round out the Jornada herbarium.

Visitors

The range management class under the direction of Prof. C. P. Wilson from the New Mexico A. & M. College spent the better portion of two days at the Station. The class was taken in hand by the Jornada personnel and instructed in the application of methods used in range investigations, reconnaissance, handling stock, and carrying capacity in the Southwest.

Personnel

Schoeller transferred from the Jornada to the Plumas National Forest as Assistant Supervisor at Quincy, California. He reported at Las Cruces in a travel status on November 13, and drove through to Quincy. Campbell accompanied him as far as Tucson, Arizona, where they both spent a day on the Santa Rita Range Reserve with Culley and Turner. Campbell spent two more days in Tucson, visiting the State University and the Desert Laboratory. He then went to the Boyce-Thompson Arboretum near Superior, Arizona, and after a day there, returned to the Station.

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SANTA RITA RANGE RESERVE

Range Conditions

The forage crop over most of the Reserve is thoroughly cured, though in places a considerable amount of green growth is evident at the base. Curing took place very rapidly this year, due to the high temperatures accompanied by continued drying winds immediately following the last rains of the summer season. As a consequence, some of the forage species and especially Rothrocks Grama did not cure as satisfactorily as usual. However, there is an abundance of vegetation everywhere on the Reserve so that what it lacks in quality is more than made up for in quanity, and stock should have no difficulty in going through the winter in fine condition.

Stock & Market

Stock are for the most part in prime condition for the season. Recent sales have been made by Parker at the following prices: 14 head of long two-year-old steers at $62.00 per head; 120 head of 8 and 9-month-old calves at $30.00 per head; 10 head of old cows at $36.00; 8 head of yearling steers at $40.00.

An interesting sidelight on Parker's outfit is revealed in a summary of his sales from 1920 to 1927 inclusive. These show that he sold an average of 73 per cent of his annual calf crop as calves - 20 per cent as yearlings, and 7 per cent as two-year olds. Approximate average sale price per head of each class over the period is as follows: calves $20.50; yearlings $33.60; two-year olds and up $48.20; cows $37.60. The practice of selling calves has paid him very well, for with his entire outfit heavily mortgaged in 1919, he is now absolutely clear and his assets are greater now than at that time.

Miscellaneous

Compilation of the past summer's field work is progressing very well. During the month, Turner spent four months in Tucson at the University of Arizona, where he was able to secure an accurate set of balances for weighing the grass samples from the clipping and volume production studies. In all, nearly 600 separate samples were weighed and many of these involved a double weighing. Summary of the clipping study is not yet completed, but it is hoped to have it out in time for the Investigative Committee Meeting at Albuquerque.

In connection with the natural revegetation study the the rainfall data for the past fourteen years has been tabulated into ten-day periods in an attempt to arrive at the effect which seasonal distribution of rainfall has upon the density changes. Complete analysis of the data will take some time to finish although there are some interesting leads already cropping out.

During the month, Turner has made a rough survey of the rodent infested areas on the reserve with a view to taking the question of eradication up with Mr. Gilchrist of the Biological Survey. The damage from rodent this fall has been very much more apparent than at any other time during the past 6 years.

Appointments

Miss Dorothy Gray of Tucson, Arizona has been appointed as stenographer in order to facilitate the compilation work and completion of the annual report prior to Investigative Committee Meeting at Albuquerque.

Visitors

Messrs. Schoeller and Campbell arrived in Tucson from the Jornada on the 13th and spent the 14th out at the reserve going over the project work. Mr. Schoeller left here on the morning of the 14th for his new post in California while Mr. Campbell remained over a day in the Tucson office for the purpose of discussing our investigative plans for the coming year.

District Forester Pooler spent the 18th out at the Reserve getting first-hand information on the various projects. Dr. Vorhies was present on the trip and, among other things, gave some interesting demonstrations on how he secured his data on the life history study of jack rabbits.

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